Perspective

Sanitation Systems (/perspective/sanitation-systems-perspective)

Section

Sanitation Systems (/sanitation-systems/sanitation-systems)

Factsheet

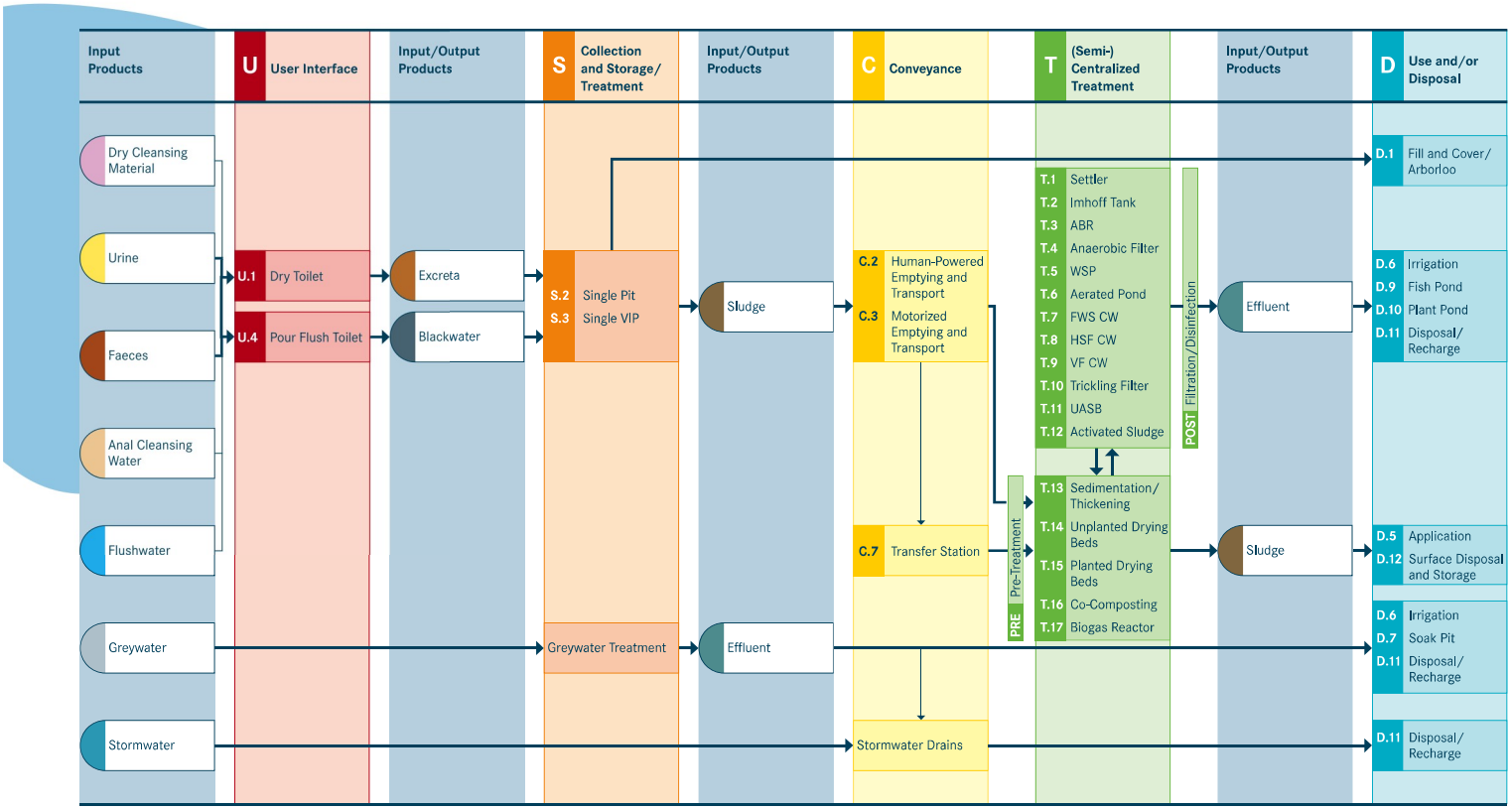
System 1: Single Pit System

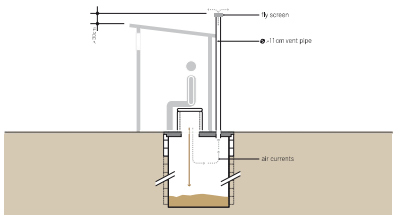
العربية (/ar/sanitation-systems/sanitation-systems/system-1:-single-pit-system)

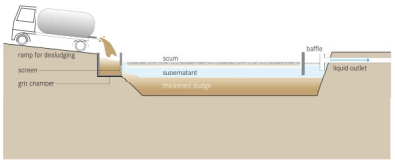
Author/Compiled by
Eawag (Swiss Federal Institute of Aquatic Science and Technology)

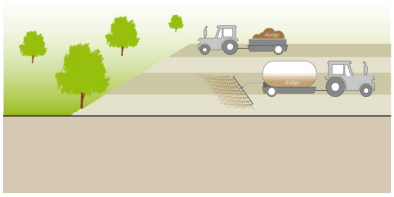
Adapted from

Compendium of Sanitation Systems and Technologies. 2nd Revised Edition (/node/5587)









This system is based on the use of a **Single Pit (/sanitation-systems/sanitation-technologies/single-pit)** technology to collect and store Excreta. The system can be used with or without Flushwater, depending on the **User Interface (/sanitation-systems/sanitation-technologies#group-u)**. Inputs to the system can include Urine, Faeces, Anal Cleansing Water, Flushwater and Dry Cleansing Materials. The use of Flushwater and/or Anal Cleansing Water will depend on water availability and local habit. The **User Interface (/sanitation-systems/sanitation-technologies#group-u)** for this system can either be a **Dry Toilet (/sanitation-systems/sanitation-technologies/dry-toilet)** or a **Pour flush Toilet (/sanitation-systems/sanitation-technologies/pour-flush-toilet)**. A **Urinal (/sanitation-systems/sanitation-technologies/urinal)** could additionally be used. The **User Interface (/sanitation-systems/sanitation-technologies#group-u)** is directly connected to a **Single Pit (/sanitation-systems/sanitation-technologies/single-pit)** or a **Single Ventilated Improved Pit (VIP) (/sanitation-systems/sanitation-technologies/single-ventilated-improved-pit-(vip))** for **Collection and Storage/Treatment (/sanitation-systems/sanitation-technologies#group-s)**.

When the pit is full there are several options. If there is space, the pit can be filled with soil and a fruit or ornamental tree can be planted, which will thrive in the nutrient rich environment (**Fill and Cover / Arborloo (/sanitation-systems/sanitation-technologies/fill-and-cover-/-arborloo)**), and a new pit built. This is generally only possible when the superstructure is mobile. Alternatively, the faecal Sludge that is generated from the **Collection and Storage/Treatment (/sanitation-systems/sanitation-technologies#group-s)** technology has to be removed and transported for further treatment. The **Conveyance (/sanitation-systems/sanitation-technologies#group-c)** technologies that can be used include **Human-powered Emptying and Transport (/sanitation-systems/sanitation-technologies/human-powered-emptying-and-transport)** or **Motorised Emptying and Transport (/sanitation-systems/sanitation-technologies/motorised-emptying-and-transport)**. A vacuum truck can only empty liquid faecal Sludge.

As the untreated faecal Sludge is highly pathogenic, human contact and direct agricultural application should be avoided. The Sludge that is removed should be transported to a dedicated faecal Sludge treatment facility (**Sedimentation/ Thickening Ponds (/sanitation-systems/sanitation-technologies/sedimentation/-thickening-ponds)**, **Unplanted Drying Beds (/sanitation-systems/sanitation-technologies/unplanted-drying-beds)**, **Planted Drying Beds (/sanitation-systems/sanitation-technologies/planted-drying-beds)**, **Co-Composting (/sanitation-systems/sanitation-technologies/co-composting)**, **Biogas Reactor (/sanitation-systems/sanitation-technologies/biogas-reactor)**). In the event that such a facility is not easily accessible, the faecal Sludge can be discharged to a **Transfer**

Station (Underground Holding Tank) (/sanitation-systems/sanitation-technologies/transfer-station-(underground-holding-tank)). From there, it will be transported to the treatment facility by a motorized vehicle (**Motorised Emptying and Transport (/sanitation-systems/sanitation-technologies/motorised-emptying-and-transport)**). A technology selection tree for faecal Sludge treatment plants is provided in Strande et al., 2014 (see Sector Development Tools, p. 8). **(Semi-) Centralized Treatment technologies (/sanitation-systems/sanitation-technologies#group-t)** produce both Effluent and Sludge, which may require further treatment prior to **Use and/or Disposal (/sanitation-systems/sanitation-technologies#group-d)**. For example, Effluent from a faecal Sludge treatment facility could be co-treated with wastewater in **Waste Stabilization Ponds (WSP) (/sanitation-systems/sanitation-technologies/waste-stabilization-ponds-(wsp))** or Constructed Wetlands (**Free-Water Surface Constructed Wetland, [8260-Horizontal Subsurface Flow Constructed Wetland (/sanitation-systems/sanitation-technologies/free-water-surface-constructed-wetland)**, **Vertical Flow Constructed Wetland (/sanitation-systems/sanitation-technologies/vertical-flow-constructed-wetland)**).

Options for the **Use and/or Disposal (/sanitation-systems/sanitation-technologies#group-d)** of the treated Effluent include **Irrigation (/sanitation-systems/sanitation-technologies/irrigation)**, **Fish Pond (Aquaculture) (/sanitation-systems/sanitation-technologies/fish-pond-(aquaculture))**, **Floating Plant Pond (/sanitation-systems/sanitation-technologies/floating-plant-pond)** or discharge to a water body (**Water Disposal / Groundwater Recharge (/sanitation-systems/sanitation-technologies/water-disposal-/-groundwater-recharge)**). After adequate treatment, Sludge can either be used in agriculture (**Application of Sludge (/sanitation-systems/sanitation-technologies/application-of-sludge)**) or brought to a Storage/Disposal site (**Surface Disposal and Storage (/sanitation-systems/sanitation-technologies/surface-disposal-and-storage)**).

Considerations

This system should be chosen only where there is either enough space to continuously dig new pits or when there is an appropriate way to empty, treat and dispose of the faecal Sludge. In dense urban settlements, there may not be sufficient space to access a pit for desludging or to make a new pit. This system is, therefore, best suited to rural and peri-urban areas where the soil is appropriate for digging pits and absorbing the leachate. It is not recommended for areas prone to heavy rains or flooding, which may cause pits to overflow.

Some Greywater in the pit may help degradation, but excessive amounts of Greywater may lead to quick filling of the pit and/or excessive leaching. All types of Dry Cleansing Materials can be discarded into the pit, although they may shorten the pit life and make it more difficult to empty. Whenever possible, Dry Cleansing Materials should be disposed of separately.

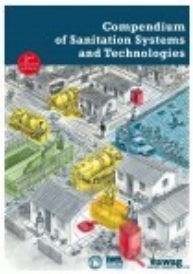
This system is one of the least expensive to construct in terms of capital cost. However, the maintenance costs may be considerable, depending on the frequency and method of pit emptying. If the ground is appropriate and has good absorptive capacity, the pit may be dug very deep (> 5m) and can be used for

several years without emptying (up to 20 or more years). However, the groundwater level and use should be taken into consideration when digging pits in order to avoid contaminating it. Although different types of pits are common in most parts of the world, a well-designed pit-based system with appropriate transport, treatment and use or disposal is rare.

Guidelines for the safe use of wasterwater excreta and greywater. Volume IV. Excreta and Greywater Use in Agriculture (/node/1133) of Sludge have been published by the World Health Organization (WHO) and are referenced on the relevant technology information sheets.

Library References

Compendium of Sanitation Systems and Technologies. 2nd Revised Edition

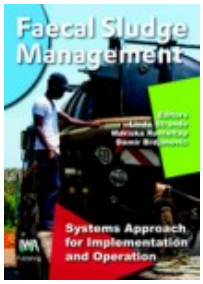


This compendium gives a systematic overview on different sanitation systems and technologies and describes a wide range of available low-cost sanitation technologies.

TILLEY, E. ULRICH, L. LUETHI, C. REYMOND, P. ZURBRUEGG, C. (2014): Compendium of Sanitation Systems and Technologies. 2nd Revised Edition. Duebendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (Eawag) **URL (http://www.eawag.ch/forschung/sandec/publikationen/compendium_e/index_EN)** [Accessed: 28.07.2014] **PDF (/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Compendium%20of%20Sanitation%20Systems%20and%20Technolo**

(/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Compendium%20of%20Sanitation%20Systems%20and%20Technolo

Faecal Sludge Management

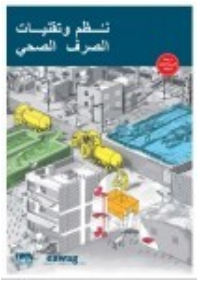


This is the first book to compile the current state of knowledge on faecal sludge management. It addresses the organization of the entire faecal sludge management service chain, from the collection and transport of sludge, to the current state of knowledge of treatment options, and the final end use or disposal of treated sludge. It presents an integrated approach that brings together technology, management, and planning, based on Sandec's 20 years of experience in the field. It also discusses important factors to consider when evaluating and upscaling new treatment technology options. The book is designed for undergraduate and graduate students, engineers, and practitioners in the field who have some basic knowledge of environmental and/or wastewater engineering.

STRANDE, L. ; RONTELTAP, M. ; BRDJANOVIC, D. (2014): Faecal Sludge Management. Systems Approach for Implementation and Operation. London: IWA Publishing **URL (http://www.sandec.ch/fsm_book)** [Accessed: 16.07.2014]

Further Readings

Compendium of Sanitation Systems and Technologies (Arabic)



This is the Arabic version of the Compendium of Sanitation Systems and Technologies. The Compendium gives a systematic overview on different sanitation systems and technologies and describes a wide range of available low-cost .sanitation technologies

TILLEY, E. ULRICH, L. LUETHI, C. REYMOND, P. SCHERTENLEIB, R. ZURBRUEGG, C. (2014): Compendium of Sanitation Systems and Technologies (Arabic). 2nd Revised Edition. Duebendorf, Switzerland: Swiss Federal Institute of Aquatic Science and Technology (Eawag) **PDF (/sites/default/files/reference_attachments/TILLEY%20et%20al%202014%20Arabic%20Compendium%20of%20Sanitation%20Systems.pdf)**

sites/)
/default/files
ce_attachments
%20Systems.pdf